



## Memorandum

To: Mark Raney

From: C. Tyler Irwin, Nick Raines

Date: November 7, 2008

Subject: Summary of Creek Investigations Completed for Libby Asbestos  
Superfund Site Operable Units 4 and 7, October 2008

### 1.0 Overview of Investigation

EPA tasked the US Department of Transportation, John A. Volpe National Transportation Systems Center (Volpe) with the investigation of several area creeks within Operable Unit 4 (OU4) in Libby, Montana and Operable Unit 7 (OU7) in Troy, Montana. The purpose of this investigation was to evaluate the presence or absence of suspect Libby Amphibole (LA) in material used for the construction of riprap in the creeks. The purpose and plan for the investigation are discussed in further detail within *Libby and Troy Creek Investigation Memo, October 2008*.

Granite Creek and Flower Creek in Libby and Callahan Creek in Troy were previously investigated in May 2008. The October 2008 investigations included Libby Creek (Cr), Parmenter Cr, Pipe Cr, Doak Cr, Bobtail Cr, Cedar Cr, and Quartz Cr in Libby (Figure 1), and Lake Cr, Iron Cr, and Brien Cr in Troy (Figure 2). All creeks are perennial streams and experience significant flow fluctuations during the spring and following heavy precipitation events. As a result, the creeks have had riprap placed at various sections by the US Army Corps of Engineers (USACE), Lincoln County, the City of Libby, and/or private land owners to control erosion. Each listed creek was investigated near overpasses, bridges, and along roadways, in residential backyards, and other populated areas. The estimated lengths of each investigated creek are listed below.

#### Troy

Lake Cr (Kootenai River Section)	1.1 miles
Lake Cr (Mid Section)	0.12 mile
Lake Cr (Overpass Section)	0.12 mile
Iron Cr	0.95 mile
Obricn Cr	0.2 mile

#### Libby

Libby Cr	6.7 miles
Libby Cr (Hammer Rd Section)	0.19 mile
Parmenter Cr	1.9 miles

Pipe Cr (Lower Section)	1 mile
Pipe Cr (Upper Section)	2 miles
Doak Cr	0.19 mile
Bobtail Cr	0.57 mile
Cedar Cr	0.6 mile
Quartz Cr	1.1 miles

Material used for the construction of riprap sections in the creeks included: 1) quarried argillite and siltstone (metasediments) from the Wallace Formation (Fm) of the Precambrian Belt Group, 2) quarried syenite from the Rainy Creek ultramafic complex, 3) basalt, and 4) concrete debris, tree stumps, wood lagging. The syenite is exposed at the Vermiculite Mountain Mine, and riprap constructed with this material is thought to have originated at the mine. LA material in the form of biotite pyroxenite, magnetite pyroxenite, and LA are often found in the presence of the syenite.

Results of the investigations are summarized in the sections below. Estimated volumes of individual sections that contain syenite and LA material are presented in Table 1.

## 2.0 Results of Creek Investigation Program

### 2.1 Introduction

Syenite and LA material were not identified in any of the Troy area creeks, and only in two Libby area creeks during the October 2008 investigation. A description of the occurrence of syenite and LA material in the Libby area creeks follows.

### 2.2 Pipe Creek (Lower Section)

A 1-mile section of Pipe Cr, beginning at the Kootenai River, was investigated on October 13, 2008 (Figure 1). Riprap material in this section of Pipe Cr is composed of metasediments and basalt except for riprap located at two residential properties on the northern bank of Pipe Cr, between Kootenai River Rd and Botham Drive (Figure 3).

Riprap located on both of these properties is composed of quarried syenite and a smaller volume of metasediments ranging in size from cobbles to boulders. The largest pieces of syenite are approximately 3 feet (ft) in length, averaging approximately 18 inches (in). The syenite locally contains LA material as fracture coatings on syenite. The fracture coatings are the most prevalent form and appear as small radiating, fibrous aggregates, light blue-gray to dull silver in color, similar to LA material observed in Libby Cr.

The riprap at 3623 Kootenai River Rd (PC-01 to PC-02) was placed in a curved, linear exposure (10 ft in total lateral extent) and is approximately 200 ft in length. The riprap at 3737 Kootenai River Rd (PC-03 to PC-04) has similar placement and is approximately 300 ft in length. The riprap at both locations is weathered and often discontinuous with indications of downstream mobilization of components due to erosion.

The locations of these two sections were surveyed with a Trimble GPS unit.

Field sketches of cross-sections of these two locations were not created due to the inconsistent and discontinuous distribution of the material. Further survey activities may be required to fully detail the physical layout of these sections of rip-rap.

### 2.3 Libby Creek

A 6.7-mile section of Libby Cr, extending from the Kootenai River to near Farm to Market Road (F-M Rd) on the south end of the section was investigated on October 9, October 10, and October 20, 2008 (Figure 1). All riprap material in this section of Libby Cr is composed of metasediments, basalt, and concrete debris, except for a small exposure of riprap located on the eastern bank of the creek, approximately 700 ft south of the Champion Haul Rd bridge (Figure 4).

This riprap section (LC-01 to LC-02) is composed of quarried syenite. The largest pieces are approximately 3 ft in length, averaging approximately 18 in. The syenite locally contains weathered xenoliths of magnetite pyroxenite and biotite pyroxenite. LA material is present in this riprap, and occurs most commonly as fracture coatings on syenite. The fracture coatings appear as small radiating, fibrous aggregates that are light blue-gray to dull silver in color. The LA is soft and has been weathered.

The riprap at this section was placed in a linear exposure (15 ft in lateral extent) and is approximately 300 ft in length. This riprap was deposited in layers. The bottom of the syenite layer (approximately 5 ft height) occurs near the water line and is covered by a 5-ft layer of basalt. The riprap is consolidated with no obvious indication of downstream mobilization of large components due to erosion.

The location of this section was surveyed with a Trimble global positioning system (GPS) unit.

A field sketch of the cross-section at this location was created in the field log notes and is available upon request. Further survey activities may be required to fully detail the physical layout of these sections of rip-rap.

## 3.0 Summary

Several creeks in the Libby and Troy areas were investigated to evaluate the presence and extent of LA material used for the construction of riprap. Riprap material at one section of Libby Cr and two sections of Pipe Cr includes quarried syenite, which is thought to have originated at the Vermiculate Mountain Mine. The syenite contains LA in the form of weathered fracture coatings. The three occurrences of syenite and LA material are listed below with location designations and estimated volumes.

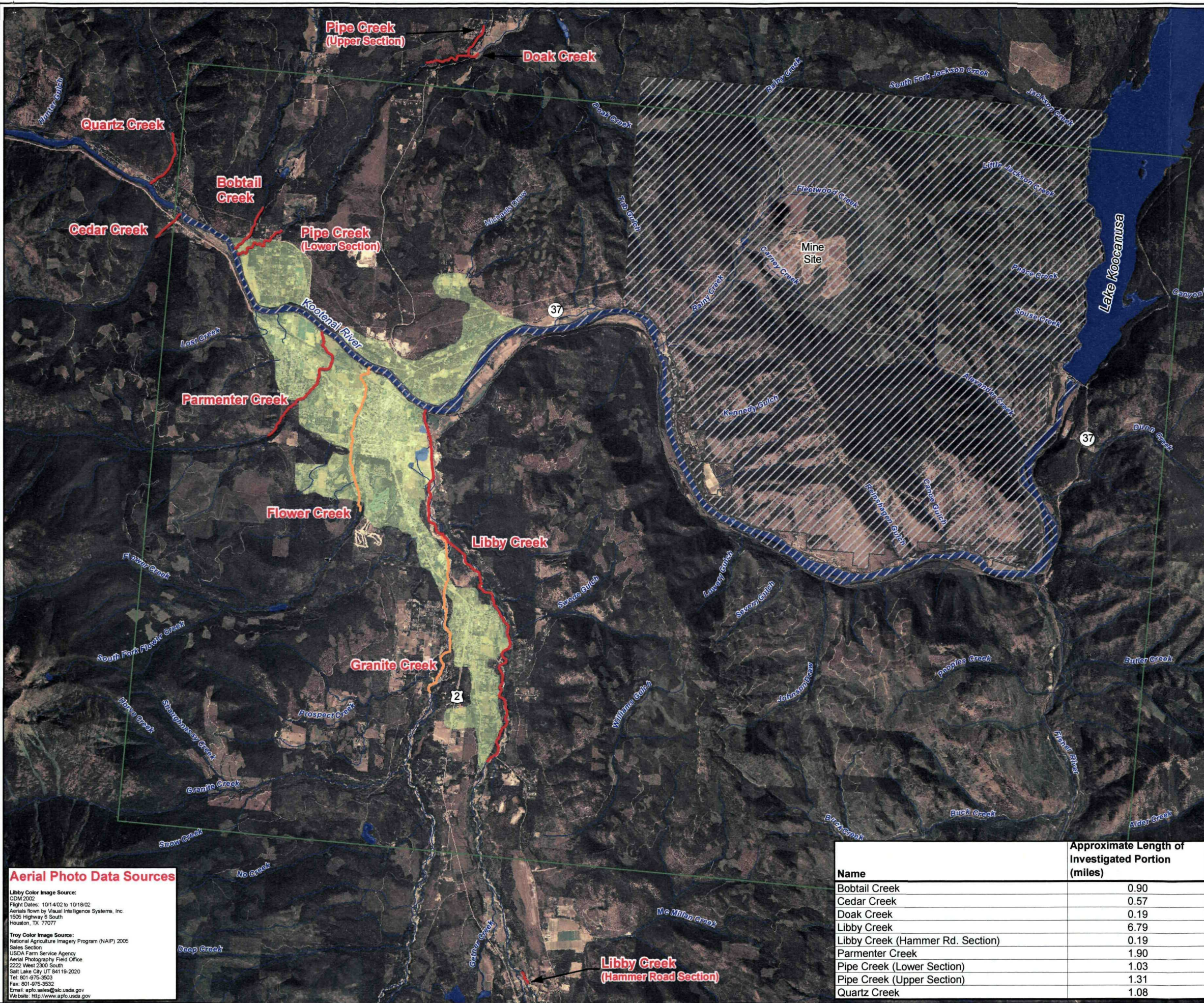
T. Irwin, N. Raines  
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Table 1 - Summary of Estimated Volumes of Riprap containing LA		
CREEK	STATION	VOLUME (bank cubic yards)
Libby Creek	LC-01 to LC-02	1,000*
Pipe Creek	PC-01 to PC-02	200
	PC-03 to PC-04	200

\*Not including overlying basalt



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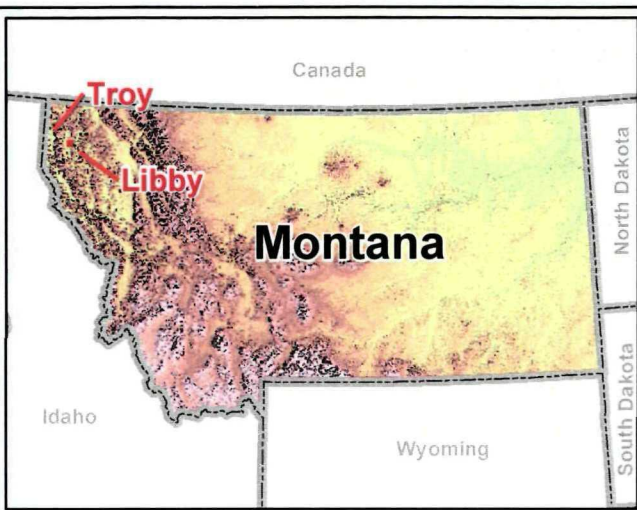


**Aerial Photo Data Sources**

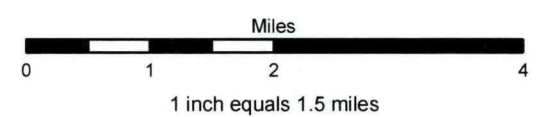
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CDM 2002  
Flight Dates: 10/14/02 to 10/19/02  
Aerials flown by Visual Intelligence Systems, Inc.  
1505 Highway 6 South  
Houston, TX 77077

Troy Color Image Source:  
National Agriculture Imagery Program (NAIP) 2005  
Sales Section  
USDA Farm Service Agency  
Aerial Photography Field Office  
2222 West 2300 South  
Salt Lake City UT 84119-2020  
Tel: 801-975-3503  
Fax: 801-975-3532  
Email: apfo.sales@aphis.usda.gov  
Website: <http://www.apfo.usda.gov>

Name	Approximate Length of Investigated Portion (miles)
Bobtail Creek	0.90
Cedar Creek	0.57
Doak Creek	0.19
Libby Creek	6.79
Libby Creek (Hammer Rd. Section)	0.19
Parmenter Creek	1.90
Pipe Creek (Lower Section)	1.03
Pipe Creek (Upper Section)	1.31
Quartz Creek	1.08



- Creeks/Rivers
- Portion of Creek Investigated
- Portion of Creek Investigated Previously
- OU4 Boundary
- OU3 Boundary
- Lake
- Populated Areas



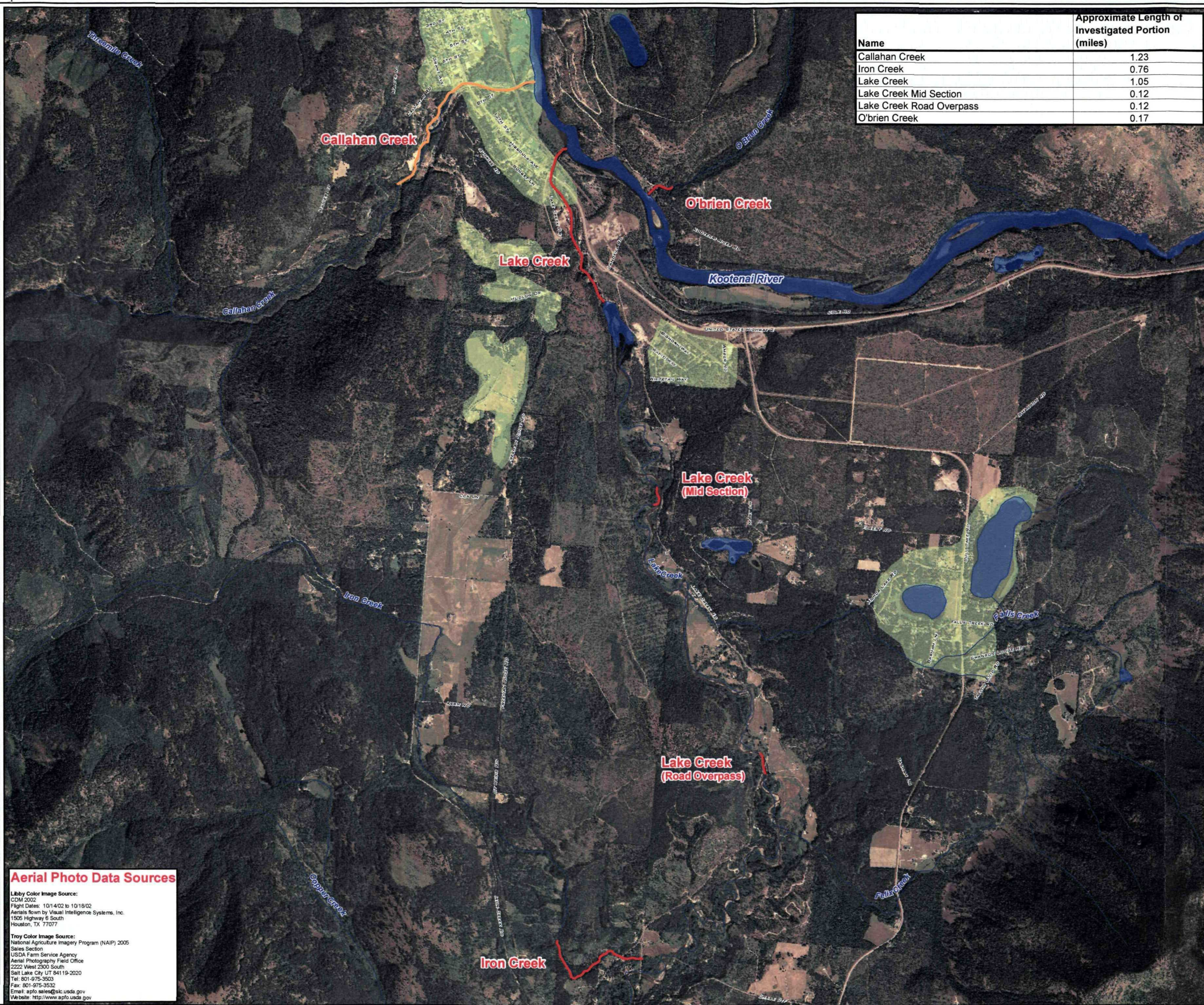
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Figure 1

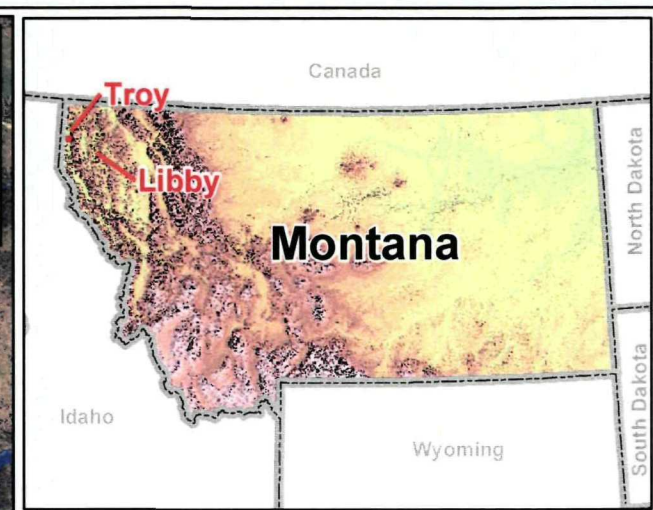
OU4 Creek Investigations  
Libby Asbestos Site  
Libby, Montana



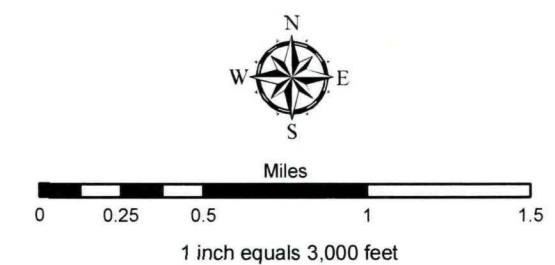
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Name	Approximate Length of Investigated Portion (miles)
Callahan Creek	1.23
Iron Creek	0.76
Lake Creek	1.05
Lake Creek Mid Section	0.12
Lake Creek Road Overpass	0.12
O'Brien Creek	0.17



- Creeks/Rivers
- Portion of Creek Investigated
- Portion of Creek Investigated Previously
- Lake
- Populated Areas



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Figure 2

Troy Area Creek Investigations  
Libby Asbestos Site  
Libby, Montana



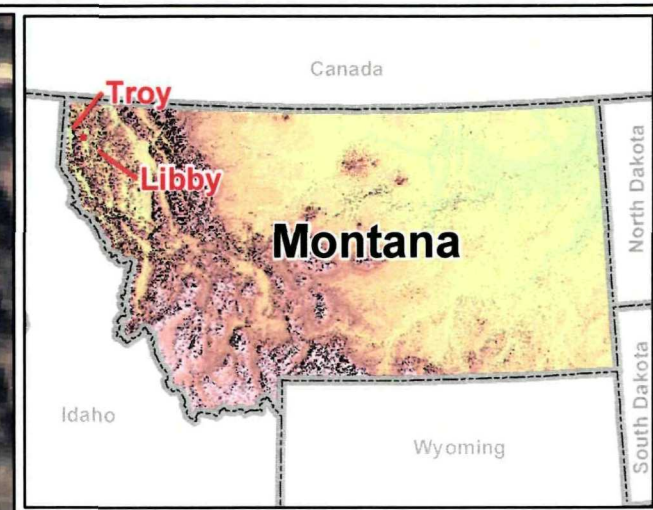
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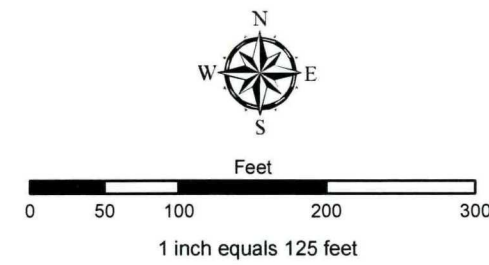
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●—● Areas Requiring Remedial Action

~~~~~ Portion of Creek Investigated



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|                                                                                          |
|------------------------------------------------------------------------------------------|
| Figure 3                                                                                 |
| Pipe Creek (Lower Section)<br>Remediation Areas<br>Libby Asbestos Site<br>Libby, Montana |
| <b>CDM</b>                                                                               |



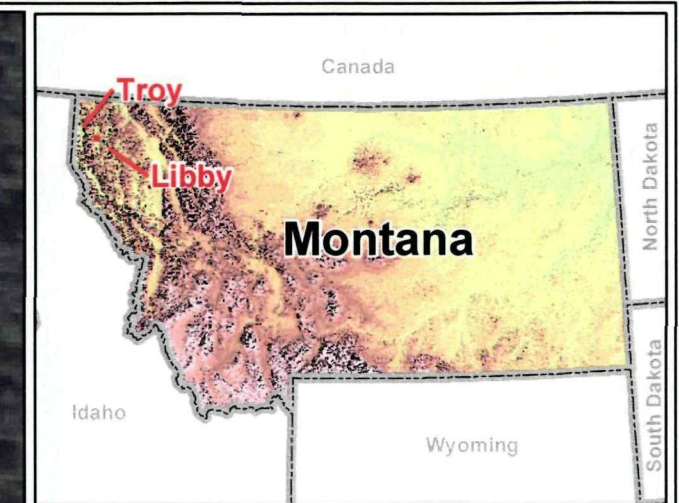
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●—● Area Requiring Remedial Action

~~~~~ Portion of Creek Investigated



Feet

0 50 100 200 300

1 inch equals 125 feet



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Figure 4

Libby Creek  
Remediation Areas  
Libby Asbestos Site  
Libby, Montana

**CDM**